इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

"जानने का अधिकार, जीने का अधिकार"
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS/ISO 20474-6 (2008): Earth Moving Machinery - Safety, Part 6: Requirements for Dumpers [MED 7: Material Handling Systems and Equipment]

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

"ज्ञान से एक नये भारत का निर्माण"
Satyanarayan Gangaram Pitroda
"Invent a New India Using Knowledge"

Made Available By
Public.Resource.Org

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS/ISO 20474-6 : 2008

भारतीय मानक

मिट्टी उठाने की मशीनरी — सुरक्षा

भाग 6 डम्पर्स की अपेक्षाएँ

Indian Standard

EARTH-MOVING MACHINERY — SAFETY

PART 6 REQUIREMENTS FOR DUMPERS

ICS 53.100

© BIS 2013

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

January 2013 **Price Group 5**

Material Handling Systems and Equipment Sectional Committee, MED 07

NATIONAL FOREWORD

This Indian Standard (Part 6) which is identical with ISO 20474-6 : 2008 'Earth-moving machinery — Safety — Part 6: Requirements for dumpers' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Material Handling Systems and Equipment Sectional Committee and approval of the Mechanical Engineering Division Council.

This standard is published in various parts. Other parts in this series are:

Part 1	General requirements
Part 2	Requirements for tractor-dozers
Part 3	Requirements for loaders
Part 4	Requirements for backhoe-loaders
Part 5	Requirements for hydraulic excavators
Part 7	Requirements for scrapers
Part 8	Requirements for graders
Part 9	Requirements for pipelayers
Part 10	Requirements for trenchers
Part 11	Requirements for earth and landfill compactors
Part 12	Requirements for cable excavators
Part 13	Requirements for rollers
Part 14	Information on national and regional provisions [Technical specification] (India's specific requirement are to be included)

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 3449 : 2005 Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements	IS/ISO 3449 : 2005 Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements	Identical
ISO 3471 : 2008 Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements	IS/ISO 3471 : 2008 Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements	do

(*Continued on third cover*)

Indian Standard

EARTH-MOVING MACHINERY — SAFETY

PART 6 REQUIREMENTS FOR DUMPERS

1 Scope

This part of ISO 20474 gives the safety requirements specific to wheeled and crawler dumpers as defined in ISO 6165, including compact dumpers and compact dumpers with standing operator. It is not applicable to road-truck-mounted dumpers. It is intended to be used in conjunction with ISO 20474-1, which specifies general safety requirements common to earth-moving machine families, and with ISO/TS 20474-14, which gives information on provisions that are mandatory in particular countries or regions. The specific requirements given in this part of ISO 20474 take precedence over the general requirements of ISO 20474-1.

This part of ISO 20474 deals with all significant hazards, hazardous situations and events relevant to the earth-moving machinery within its Scope when used as intended or under conditions of misuse reasonably foreseeable by the manufacturer (see also ISO/TS 20474-14). It specifies the appropriate technical measures for eliminating or reducing risks arising from significant hazards, hazardous situations or events during commissioning, operation and maintenance. It is not applicable to machines manufactured before the date of its publication.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3449:2005, *Earth-moving machinery — Falling-object protective structures — Laboratory tests and performance requirements*

ISO 3471, *Earth-moving machinery — Roll-over protective structures — Laboratory tests and performance requirements*

ISO 6165, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 6016, *Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components*

ISO 6683, *Earth-moving machinery — Seat belts and seat belt anchorages — Performance requirements and tests*

ISO 7096:2000, *Earth-moving machinery — Laboratory evaluation of operator seat vibration*

ISO 7132, *Earth-moving machinery — Dumpers — Terminology and commercial specifications*

ISO 10268, *Earth-moving machinery — Retarders for dumpers and tractor-scrapers — Performance tests*

ISO 10570, *Earth-moving machinery — Articulated frame lock — Performance requirements*

ISO 13333, *Earth-moving machinery — Dumper body support and operator's cab tilt support devices*

ISO 20474-1:2008, *Earth-moving machinery — Safety — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20474-1 and ISO 7132, and the following, apply.

3.1
dumper
self-propelled crawler or wheeled machine, with an open body, which transports and dumps or spreads material

NOTE 1 See ISO 6165 and Figures A.1 and A.2.

NOTE 2 Except in the case of compact dumpers, loading is performed by other machines or equipment.

3.2
rigid frame dumper
dumper with a rigid frame and wheel or crawler steering

NOTE See ISO 6165 and Figure A.1 (and Figure A.3).

3.3
articulated frame dumper
dumper with an articulated frame for steering

NOTE See ISO 6165 and Figure A.2.

3.4
swing dumper
dumper having a 360° swing upper structure

NOTE 1 See ISO 6165.

NOTE 2 The upper structure is comprised of a rigid frame, open body and operator's station; the undercarriage consists of a track-type or wheeled unit.

3.5
compact dumper
articulated or rigid dumper having an operating mass in accordance with ISO 6016 of 4 500 kg or less

NOTE 1 See ISO 6165 and Figures A.4, A.5 and A.6.

NOTE 2 A compact dumper may have integral self-loading equipment.

3.6
self-loading equipment
integral mounted bucket-supporting structure and linkage permanently fitted to the dumper, enabling it to fill its own open body with material

NOTE See Figure A.6.

4 Safety requirements and/or protective measures

4.1 General

Dumpers shall comply with the safety requirements and/or protective measures of ISO 20474-1, in as far as those are not modified by the specific requirements of this clause.

4.2 Dump body

4.2.1 Control device

When the content of the body can be dumped manually, the control device shall be designed and placed so that opening and closing can be actuated safely, e.g. from the operator's position or from a side different from the tipping direction.

4.2.2 Body lowering

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.2.3 Body-down indicator

Dumpers — except for compact dumpers and crawler dumpers without an enclosed cab — shall have the following provisions:

- a device preventing travelling in a transmission ratio higher than second gear or with a speed greater than 10 km/h when the body is not completely lowered;
- an audible and/or visible warning device functioning when the body is not in a lowered position and the transmission is engaged.

4.2.4 Body support device

The device shall meet the requirements given in ISO 13333.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.2.5 Sticking load

Where there is a risk of losing stability while dumping due to the load (e.g. wet clay or freezing material) sticking to the body, provision shall be made to assist the discharge of the load.

EXAMPLE Provision of an exhaust heating system for the dump body.

Compact dumpers are excluded from this requirement.

4.3 Retarder

Dumpers, except for compact dumpers and crawler dumpers, shall be equipped with a retarder system that is in accordance with ISO 10268.

4.4 Articulated frame lock

Articulated frame lock devices shall be in accordance with ISO 10570.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.5 Roll-over protective structures (ROPS)

ISO 20474-1:2008, 4.3.3, shall apply, except in the case of compact dumpers with a seated operator, whose ROPS shall be in accordance with ISO 3471.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.6 Falling object protective structure (FOPS)

4.6.1 General

ISO 20474-1:2008, 4.3.4, shall apply with the additions/exceptions specified in 4.6.2 and 4.6.3.

4.6.2 FOPS level (other than compact dumpers)

Dumpers other than compact dumpers shall be fitted with FOPS in accordance with ISO 3449:2005, level II.

4.6.3 Compact dumper

4.6.3.1 Compact dumper equipped with a cab

A compact dumper equipped with a cab shall be designed and built so that a FOPS can be fitted that is in accordance with ISO 3449:2005, level I.

4.6.3.2 Compact dumper with self-loading equipment

Compact dumpers with self-loading equipment shall be fitted with a FOPS structure that is in accordance with ISO 3449:2005, level II, if the load passes over the operator's station.

4.7 Operator's station

4.7.1 Cab

ISO 20474-1:2008, 4.3.2, shall apply with the exception that compact dumpers do not require a cab unless used in hazardous conditions detrimental to the operator's health.

4.7.2 Operator's seat

ISO 20474-1:2008, 4.4.1, shall apply with the addition that the seat shall meet the requirements of the following input spectral class according to ISO 7096:2000:

- class EM1 for wheeled dumpers;
- class EM7 for compact dumpers.

If suspension seats are provided in certain regions as an option, they shall also meet the above requirements.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.7.3 Compact dumpers with a standing operator position

4.7.3.1 General

The travel speed of compact dumpers with a standing operator position shall not exceeding 4 km/h.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.7.3.2 Controls

Machine-propelling movements shall be controlled with hold-to-run controls.

A suitable device allowing the operator to hold and support himself during machine travel shall be provided. If a ride-on platform is fitted, the device shall not restrict or impede the operator's access to and from the platform.

Travel and directional controls shall be designed so as to allow the operator to have one hand free to support himself, reducing the risk of inadvertent contact with the controls.

4.7.3.3 Operator's station

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.8 Steering system

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

4.8.1 General

ISO 20474-1:2008, 4.6.1, shall apply with the additions given in 4.8.2 and 4.8.3.

4.8.2 Steering controls for machines with swivelling seats

For dumpers equipped with a swivelling seat (180°), the steering system shall be such that the movement of the steering control corresponds to the intended direction in both seat positions.

4.8.3 Controls for steering and driving of machines with turnable upper structure

The movement of the control for the driving and the steering need not correspond to the intended direction of movement if the upper structure is not in a normal driving direction.

4.9 Seat belts

Dumpers shall have seat belts in accordance with ISO 6683.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

5 Verification of safety requirements and/or protective measures

ISO 20474-1:2008, Clause 5, shall apply.

6 Information for use

ISO 20474-1:2008, Clause 6, shall apply with the following additions to the operator's manual (6.2):

a) instructions for safe dumping;

b) instructions that, when tipping a load from a dumper, the centre of gravity will change continuously and the condition of the ground will determine the stability of the machine (there are special hazards for wheeled dumpers working on soft ground and when the load, e.g. wet clay or freezing material, sticks to the body);

c) instructions that, when loading compact dumpers fitted with self-loading equipment, for reasons of stability, the machine shall be placed on firm level ground, and that loading shall be avoided on soft and uneven ground;

d) instructions in the procedure for obtaining the maximum braking performance (e.g. applying the longitudinal differential lock) in downhill operation under icy or slippery conditions;

e) instructions on the use of a retarder during downhill operations, such as the prescription that full use of the retarder shall be made before applying the service brakes.

For mandatory national and/or regional provisions, see ISO/TS 20474-14.

Annex A
(informative)

Illustrations

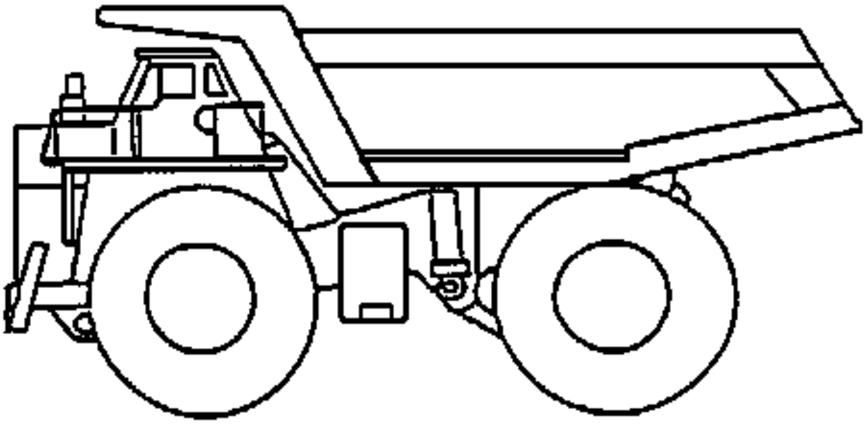

Figure A.1 — Rigid frame dumper

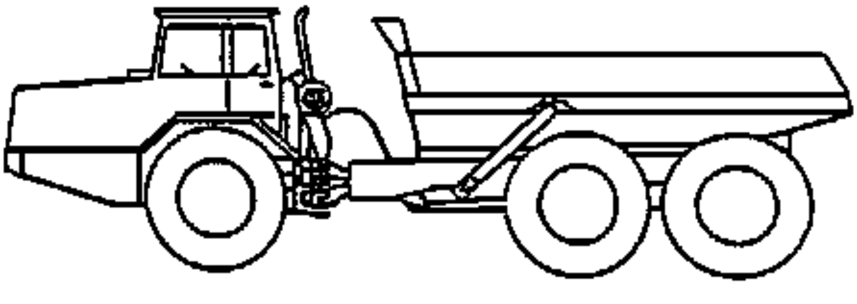

Figure A.2 — Articulated frame dumper

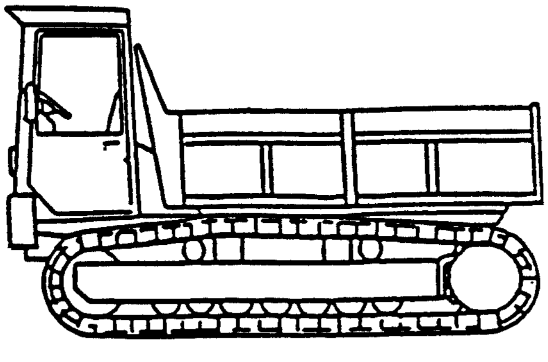

Figure A.3 — Crawler dumper

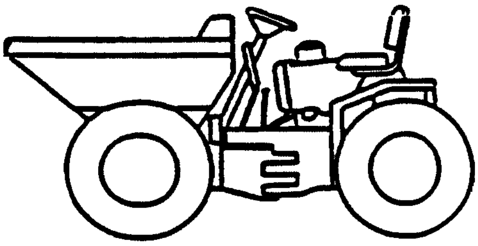

Figure A.4 — Wheeled compact dumper

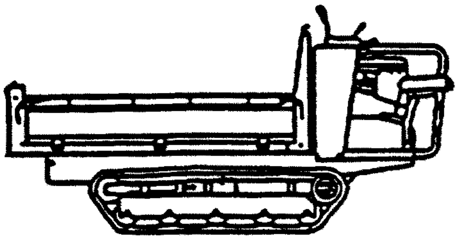

Figure A.5 — Crawler compact dumper

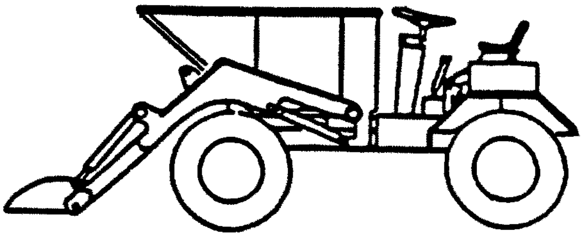

Figure A.6 — Compact dumper with self-loading equipment

Bibliography

[1] ISO 3164, *Earth-moving machinery — Laboratory evaluations of protective structures — Specifications for deflection-limiting volume*

[2] ISO 12100-1, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

[3] ISO 12100-2, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

(*Continued from second cover*)

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 6165 : 2006 Earth-moving machinery — Basic types — Identification and terms and definitions	IS/ISO 6165 : 2006 Earth-moving machinery — Basic types — Identification and terms and definitions	Identical
ISO 20474-1 : 2008 Earth-moving machinery — Safety — Part 1: General requirements	IS/ISO 20474-1 : 2008 Earth-moving machinery — Safety: Part 1 General requirements	do

The technical committee has reviewed the provisions of the following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO 6016 : 2008	Earth-moving machinery — Methods of measuring the masses of whole machines, their equipment and components
ISO 6683 : 2005	Earth-moving machinery — Seat belts and seat belt anchorages — Performance requirements and tests
ISO 7096 : 2000	Earth-moving machinery — Laboratory evaluation of operator seat vibration
ISO 7132 : 2003	Earth-moving machinery — Dumpers — Terminology and commercial specifications
ISO 10268 : 1993	Earth-moving machinery — Retarders for dumpers and tractor-scrapers — Performance tests
ISO 10570 : 2004	Earth-moving machinery — Articulated frame lock — Performance requirements
ISO 13333 : 1994	Earth-moving machinery — Dumper body support and operator's cab tilt support devices

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: MED 07 (1141).

Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.org.in

Regional Offices:		*Telephones*
Central	Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
Eastern	1/14, C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi KOLKATA 700054	2337 8499, 2337 8561 2337 8626, 2337 9120
Northern	SCO 335-336, Sector 34-A, CHANDIGARH 160022	260 3843 260 9285
Southern	C.I.T. Campus, IV Cross Road, CHENNAI 600113	2254 1216, 2254 1442 2254 2519, 2254 2315
Western	Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	2832 9295, 2832 7858 2832 7891, 2832 7892

Branches: AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. THIRUVANATHAPURAM. VISAKHAPATNAM.

Published by BIS, New Delhi